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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Jens Von Berg

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS

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BRIARCLIFF MANOR, NY 10510

EXAMINER

CONWAY, THOMAS A

ART UNIT

PAPER NUMBER

2624

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/598,005	Applicant(s) VON BERG, JENS	
	Examiner THOMAS A. CONWAY	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/15/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. **Claims 1 and 9 are objected** to because of the following informalities: words following colons are capitalized denoting independent sentences. Appropriate correction is required.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore;

- a. the recitation of imaging methods generated with the same modality with different imaging conditions as presented in claim 3 must be shown or the feature(s) canceled from the claim. Also;
- b. the recitation of arrangement for considering the positions measured with the help of a position-measuring apparatus and/or a calibration of the images during registration as presented in claim 7 must be shown or the feature(s) canceled from the claim. Also;
- c. the recitation of steps repeating many times with variation of at least one of the transformed images as presented in claim 10 must be shown or the feature(s) canceled from the claim.

No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended

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replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 1 and 9 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the

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invention. Specifically claims 1 and 9 recite image features of the first imaging method are reduced (A) **and/or** characteristic image features of the second imaging method are intensified (B). The use of “and/or” implies that A OR B OR (A and B) must be disclosed to enable the claim.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claim 7** recites the limitation "the positions measured" in line 2. There is insufficient antecedent basis for this limitation in the claim.

5. **Claim 8** recites the limitation "the flexible registration method" in line 2. There is insufficient antecedent basis for this limitation in the claim. Examiner would like to make note that while the specification may point to MAINTZ, J.B.A., et al. (A survey of medical image registration; 1998; Medical Image Analysis; 2(1); pp 1-36) to identify the method in question, no where in Maintz is a flexible registration method identified.

6. **Claim 10 is rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, claim 10 recites that steps are repeated “many” times. It is unclear what number of times would constitute many. For the purposes of compact prosecution, the Examiner understands this term to mean any number of times greater than one.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 and 4-10 are rejected under 35 U.S.C. 102(b) as being anticipated by LIN, K-P., et al.; A General Technique for Interstudy Registration of Multifunction and Multimodality Images; 1994; IEEE Trans. on Nuclear Medicine; 41(6); pp 2850-2855: hereafter “Lin”.

7. **Regarding claim 1**, Lin teaches a data processing device for registration of a first image of an object, which first image was obtained with a first imaging method, having a second image of the object, which second image was obtained with a second imaging method different from the first imaging method (Fig. 2: MR and PET imaging modalities), wherein the data processing device is equipped for executing the following steps: a) Generating a first transformed image from the first image, in which characteristic image features of the first imaging method are reduced (pp 2850, Col. 1: MR images are pre-edited to exclude nonbrain structures) and/or characteristic image features of the second imaging method are intensified (pp 2851, Sec. B: PET images are simulated according to various tracers); b) Generating a second transformed image

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from the second imaged, in which, optionally characteristic image features of the second imaging method are reduced and optionally, characteristic image features of the first imaging method are intensified (pp 2851, Sec. A: various feature images (f1-f5) - first imaging method in intensified); c) Registration of the transformed images (pp 2851, Sec. C – see also Fig. 2).

8. **Regarding claim 2**, Lin teaches the data processing device as claimed in claim 1, wherein the imaging methods comprise the application of different modalities, wherein one of the modalities is a computer tomography, an X-ray projection, a magnetic resonance imaging method, an ultrasound method, an X-ray fluoroscopy or a CT-fluoroscopy and wherein the image obtained thereby is two dimensional or three dimensional (pp 2851, ¶s 2 and 3: PET and MR).

9. **Regarding claim 4**, Lin teaches the data processing device as claimed in claim 1, which is arranged for executing a feature-based registration of the transformed images (pp 2851, Sec. C: pixel values).

10. **Regarding claim 5**, Lin teaches the data processing device as claimed in claim 1, which is arranged for segmenting object areas with different material composition in at least one of the images (pp2850, Col. 1: exclude nonbrain structures).

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11. **Claim 6 is rejected** for at least the same reasoning as was previously presented with regards to claim 5.

12. **Regarding claim 7**, Lin teaches the data processing device as claimed in claim 1, which is arranged for considering the positions measured with the help of a position-measuring apparatus and/or a calibration of the images during the registration (pp 2851, Sec. C: resliced PET images...with orientation of original MR images; measurement of MSD between all pixel values of the two image sets are also optimized (calibrated)).

13. **Regarding claim 8**, Lin teaches the data processing device as claimed in claim 1, which is arranged for using the flexible registration method (pp 2851, Sec. C: registration method is flexible in that is intermodal).

14. **Claim 9 is rejected** for at least the same reasoning as was previously presented with regards to claim 1.

15. **Regarding claim 10**, Lin teaches the process as claimed in claim 9, wherein, the steps a), b) and c) are repeated many times with variation of at least one of the transformed images, in order to maximize a degree of similarity between the transformed images (pp 2851, Sec. C: convergence of iterative procedure was achieved in two iterations).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lin in view of Plum.

16. Lin teaches the data processing device of claim 1 but fails to teach wherein the imaging methods were generated with the same modality with different imaging conditions.

Plum in the same field of endeavor teaches wherein the imaging methods were generated with the same modality with different imaging conditions (pp 996, Sec G(1):

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"Monomodality"). Pluim states that mutual information has the advantage to register multimodality images and has "also been shown to be well suited to registration of images of the same modality". Lin states that image registration variations can occur due to the impossibility of imaging a subject in identical positions and orientations (Introduction) – this type of variation is often found in intra-modality imaging.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to apply the known technique of Pluim to Lin's teaching to yield predictable results of improved registration between images of a single modality where variations have occurred due to subject movement.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Moshfeghi (US 5633951 A), Miga et al. (US 7103399 B2), Wyman et al. (US 7106891 B2), Bloch (US 7397934 B2), Sun et al. (US B2), Miga et al. (US 7647087 B2), Huizenga et al. (US 7657299 B2), Eck et al. (US 7822241 B2): each discloses registration of multi modal imaging.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THOMAS A. CONWAY whose telephone number is (571)270-5851. The examiner can normally be reached on Monday through Friday 8AM - 5PM EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on 571-272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Thomas A. Conway/
Examiner, Art Unit 2624

/Tom Y Lu/
Primary Examiner, Art Unit 2624